



1900 - FALL PROTECTION PROGRAM

Document History

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This document will be reviewed routinely and updated with changes as needed. Departments listed as having roles and responsibilities are provided with updated version of this document upon revision.

Contents

1900 - Fall Protection Program	1
Document History	1
Purpose	3
Scope	3
Definitions.....	3
Responsibilities	5
UVA Facilities Management.....	5
Supervisor or Other Competent Person.....	5
Employees.....	5
Procedure.....	6
Governmental Standards.....	6
Standards, University of Virginia.....	6
Guardrail Systems	6
Fall Restraint/Prevention Systems.....	7
Personal Fall Arrest Systems (PFAS).....	8
Preventing a Fall	10
Stopping/Arresting a Fall.....	10
Protection from Falling Objects.....	11
Elevated Personnel Platforms and Ladders.....	11
Rooftop Work	12

Storage.....	12
Inspections.....	12
Prompt Rescue of an Employee in the Event of a Fall.....	12
Incident Investigations.....	12
Training.....	13
Certification.....	13
Retraining.....	13

Purpose

The purpose of this program is to provide fall protection procedures to prevent injury to employees while performing work assignments at elevated working levels.

Scope

This program applies to all University Of Virginia employees when work assignments expose them to fall hazards exceeding four feet. This includes work considered industrial or construction in nature, when the work area is not protected by permanent guardrails, suitable parapet walls or other protective devices.

Potential fall hazards include floor openings, wall openings, holes in any working/walking surface, aerial platform, and rooftop/leading edge work.

Definitions

"Anchorage" means a secure point of attachment for lifelines, lanyards or deceleration devices.

"Full-Body harness" means straps which may be secured about the employee in a manner that will distribute the fall arrest forces over at least the thighs, pelvis, waist, chest and shoulders with means for attaching it to other components of a personal fall arrest system.

"Buckle" means any device for holding the body belt or body harness closed around the employee's body.

"Carabineer" - see Snaphook

"Competent Person" – A person with the knowledge, training and experience to recognize hazardous conditions to workers and who has authorization to take prompt corrective measures to eliminate them

"Connector" means a device which is used to couple (connect) parts of the personal fall arrest system and positioning device systems together. It may be an independent component of the system, such as a carabineer, or it may be an integral component of part of the system (such as a buckle or D-ring sewn into a body belt or body harness, or a snap-hook spliced or sewn to a lanyard or self-retracting lanyard).

"Deceleration device" means any mechanism, such as a rope grab, rip-stitch lanyard, specially-woven lanyard, tearing or deforming lanyards, automatic self-retracting lifelines/lanyards, etc., which serves to dissipate a substantial amount of energy during a fall arrest, or otherwise limit the energy imposed on an employee during fall arrest.

"Deceleration distance" means the additional vertical distance a falling employee travels, excluding lifeline elongation and free fall distance, before stopping, from the point at which the deceleration device begins to operate. It is measured as the distance between the location of an employee's body belt or body harness attachment point at the moment of activation (at the onset of fall arrest forces) of the deceleration device during a fall, and the location of that attachment point after the employee comes to a full stop.

"Equivalent" means alternative designs, materials, or methods to protect against a hazard which the employer can demonstrate will provide an equal or greater degree of safety for employees than the methods, materials or designs specified in the standard.

"Fall Restraint/Prevention" means a protective system that prevents workers from reaching an edge where a fall is possible. The restraint is generally a line from an anchorage to which the employee is secured in such a

way as to prevent the employee from walking or falling off an elevated work surface. A “traveling restraint system” would refer to a line between two anchorages that would enable the employee to attach to that line yet limit travel in such a manner as to prevent exposure to a fall hazard. Travel restraint systems must be used such that they do not support any portion of the employee's weight, and freely travel between the anchorages while preventing the possibility of a fall.

"Failure" means load refusal, breakage, or separation of component parts. Load refusal is the point where the ultimate strength is exceeded.

"Free fall" means the act of falling before a personal fall arrest system begins to apply force to arrest the fall.

"Free fall distance" means the vertical displacement of the fall arrest attachment point on the employee's body belt or body harness between onset of the fall and just before the system begins to apply force to arrest the fall. This distance excludes deceleration distance, and lifeline/lanyard elongation, but includes any deceleration device slide distance or self-retracting lifeline/lanyard extension before they operate and fall arrest forces occur.

"Guardrail system" means a barrier erected to prevent employees from falling to lower levels.

"*Hole*" means a gap or void 2 inches or more in its least dimension, in a floor, roof, or other walking/working surface.

"Infeasible" means that it is impossible to perform the inspection work using a conventional fall protection system (i.e., guardrail system or personal fall arrest system) or that it is technologically impossible to use either of these systems to provide fall protection. **CONTACT UVA Facilities Management before beginning work if you believe that fall protection for your job or task is infeasible.**

"Lanyard" means a flexible line of rope, wire rope, or strap which generally has a connector at each end for connecting the body belt or body harness to a deceleration device, lifeline, or anchorage.

"Lifeline" means a component consisting of a flexible line for connection to an anchorage at one end to hang vertically (vertical lifeline), or for connection to anchorages at both ends to stretch horizontally (horizontal lifeline), and which serves as a means for connecting other components of a personal fall arrest system to the anchorage.

"Lower levels" means those areas or surfaces to which an employee can fall. Such areas or surfaces include, but are not limited to, ground levels, floors, platforms, ramps, runways, excavations, pits, tanks, material, water, equipment, structures, or portions thereof.

"Personal fall arrest system" means a system used to arrest an employee in a fall from a working level. It consists of an anchorage, connectors, a full-body harness and may include a lanyard, deceleration device, lifeline, or suitable combinations of these.

"Positioning device system" means a body belt or body harness system rigged to allow an employee to be supported on an elevated vertical surface, such as a wall, and work with both hands free while leaning.

"Qualified Person" means one who, by possession of a recognized degree and expertise, has successfully demonstrated his ability and expertise in designing fall protection systems.

"Rope grab" means a deceleration device which travels on a lifeline and automatically, by friction, engages the lifeline and locks so as to arrest the fall of an employee. A rope grab usually employs the principle of inertial locking, cam/level locking, or both.

"Self-retracting lifeline/lanyard" means a deceleration device containing a drum-wound line which can be slowly extracted from, or retracted onto, the drum under slight tension during normal employee movement, and which, after onset of a fall, automatically locks the drum and arrests the fall.

"Snaphook" means a connector comprised of a hook-shaped member with a normally closed keeper, or similar arrangement, which may be opened to permit the hook to receive an object and, when released, automatically closes to retain the object. Snaphooks are generally one of two types: (1) The locking type with a self-closing, self-locking keeper which remains closed and locked until unlocked and pressed open for connection or disconnection; or (2) The non-locking type with a self-closing keeper which remains closed until pressed open for connection or disconnection. As of January 1, 1998, the use of a non-locking snaphook as part of personal fall arrest systems and positioning device systems is prohibited.

"Unprotected sides and edges" means any side or edge (except at entrances to points of access) of a walking/working surface, e.g., floor, roof, ramp, or runway where there is no wall or guardrail system at least 39 inches (1.0 m) high.

"Walking/working surface" means any surface, whether horizontal or vertical on which an employee walks or works, including, but not limited to, floors, roofs, ramps, bridges, runways, formwork and concrete reinforcing steel but not including ladders, vehicles, or trailers, on which employees must be located in order to perform their job duties.

"Work area" means that portion of a walking/working surface where job duties are being performed.

Responsibilities

UVA Facilities Management

It is the responsibility of the UVA Facilities Management to implement this Fall Protection Program. Continual observational safety checks of work operations and rigid enforcement of the safety policy and procedures shall be ongoing. All jobs shall be pre-planned prior to the start of work.

Supervisor or Other Competent Person

The Supervisor shall ensure that all persons assigned to work at elevated levels, exceeding 4 feet in height or more above lower level and where guardrails are not utilized, be protected by personal fall protection equipment.

- Shall make an assessment of the immediate work area before work begins to determine the best arrangement of personal fall arrest equipment including appropriate anchor point selection for fall arrest or fall restraint, selection of most appropriate lanyard type and size and any other hazards to workers in the work area.
- Ensure that fall protection equipment is available and in safe working condition.
- Ensure that all employees have required training.
- Shall make exposure determinations and shall discuss with their employees the extent to which scaffolds, ladders or vehicle-mounted work platforms can be used.
- Provide for emergency rescue in the event of a fall. Pre-plan the job to ensure that employees have been properly trained in the use, limitations, inspections and rescue procedures and that training records are on file.

Employees

Employees shall ensure they have and use the fall protection equipment as required by this program and:

- Understand the potential hazards of working at elevated levels as well as gaining access to and from the work location.
- Pre-plan the job with his/her supervisor to agree that the job can be done safely.
- Never undertake work that they are not trained for or be exposed to fall hazards over 4'
- Understand the use and limitations of fall protection equipment.
- Inspect such equipment before each use and to report defective equipment immediately to their supervisor.

Procedure

Fall protection is required whenever employees are potentially exposed to falls from heights of four feet or greater to lower levels. This includes work near and around excavations deeper than 4'. Guard rails, fall restraint/prevention or personal fall arrest systems should be used when feasible. Facilities Management must be contacted before work begins if it is determined that traditional methods of fall protection are not feasible. This work may not begin without Facilities Management approval.

Holes in floors, roofs, or other walking/working surface must be effectively covered. The cover should be designed to sustain all intended loads, secured from movement and labeled "hole" or "cover".

Fall protection equipment will meet the requirements of applicable ANSI, ASTM or OSHA requirements. When purchasing equipment and raw materials for use in fall protection systems, all applicable ANSI and ASTM requirements must be met. The Facilities Safety Department will pre-select fall protection equipment for all workers to ensure compatibility of components. A list of the equipment, part numbers and sources is available in their office.

Governmental Standards

The bulk of UVA Facilities Management activities are considered "industrial" in nature and the federal OSHA standards for General Industry safety apply. However, federal OSHA standards for construction safety apply when facility work involves construction, alteration, renovation and/or repair activities, including painting and decorating.

Applicable OSHA Standards:

- 29CFR1910 Occupational Safety and Health Standards (General Industry)
- 29CFR1926 Safety and Health Regulations for Construction
- (ANSI/ASSE) Z539

Standards, University of Virginia

The following are minimum standards for University Of Virginia employee protective equipment.

Guardrail Systems

- Every open-sided floor or platform 4 feet or more above adjacent floor or ground level shall be guarded by a standard railing on all open sides except where there is entrance to a ramp, stairway, or fixed ladder.
- The railing shall be provided with a toeboard wherever, beneath the open sides, persons can pass, there is moving machinery below, or there is equipment with which falling materials could create a hazard.
- A standard railing shall consist of top rail, intermediate rail, and posts, and shall have a vertical height of 42 inches nominal from upper surface of top rail to floor, platform, runway, or ramp level.
- The top rail shall be smooth-surfaced throughout the length of the railing. The intermediate rail shall be approximately halfway between the top rail and the floor, platform, runway, or ramp. The ends of

the rails shall not overhang the terminal posts except where such overhang does not constitute a projection hazard.

- For wood railings, the posts shall be of at least 2-inch by 4-inch stock spaced not to exceed 6 feet; the top and intermediate rails shall be of at least 2-inch by 4-inch stock. If top rail is made of two right-angle pieces of 1-inch by 4-inch stock, posts may be spaced on 8-foot centers, with 2-inch by 4-inch intermediate rail.
- For pipe railings, posts and top and intermediate railings shall be at least 1 1/2 inches nominal diameter with posts spaced not more than 8 feet on centers.
- For structural steel railings, posts and top and intermediate rails shall be of 2-inch by 2-inch by 3/8-inch angles or other metal shapes of equivalent bending strength with posts spaced not more than 8 feet on centers.
- The anchoring of posts and framing of members for railings of all types shall be of such construction that the completed structure shall be capable of withstanding a load of at least 200 pounds applied in any direction at any point on the top rail.
- A standard toeboard shall be 4 inches nominal in vertical height from its top edge to the level of the floor, platform, runway, or ramp. It shall be securely fastened in place and with not more than 1/4-inch clearance above floor level. It may be made of any substantial material either solid or with openings not over 1 inch in greatest dimension.
- Guardrailing systems may be temporary and erected for specific tasks. They must meet the same height and performance requirements as permanent guardrails.
- Guardrail height must be adjusted to accommodate the height of stilts, if they are in use.

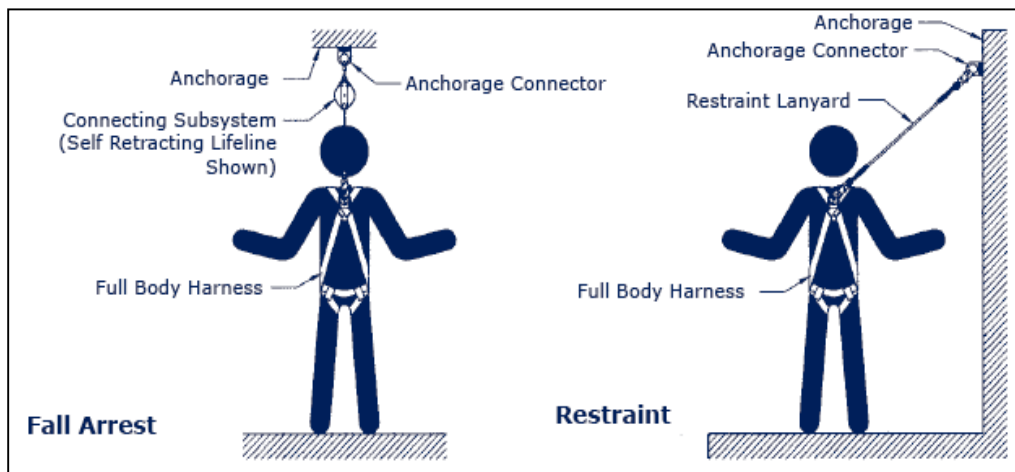


Figure 1 - Personal Fall Arrest System vs. Fall Restraint/Prevention System

Fall Restraint/Prevention Systems

Where workers must work at an elevated working surface while exposed to fall hazards and a guardrail system isn't feasible, a fall restraint/prevention system is first option considered to protect employees. A fall restraint is arranged to not allow the worker to reach the edge where a fall is possible. Fall restraint/prevention systems require:

- A competent person to assess the work area to ensure that a fall restraint/prevention system is feasible and to assist the worker in designating a suitable anchor point and system components.
- The connecting lanyard must be adjusted to a length that will not allow the worker to reach the edge where a free fall is possible
- A full-body harness must be used in a fall restraint/prevention system
- An anchor system that is rated to at least 3000lbs for standard restraint system.

- Direct supervision of workers using fall restraint/prevention systems is critical to ensure that lanyards and lifelines are adjusted properly.

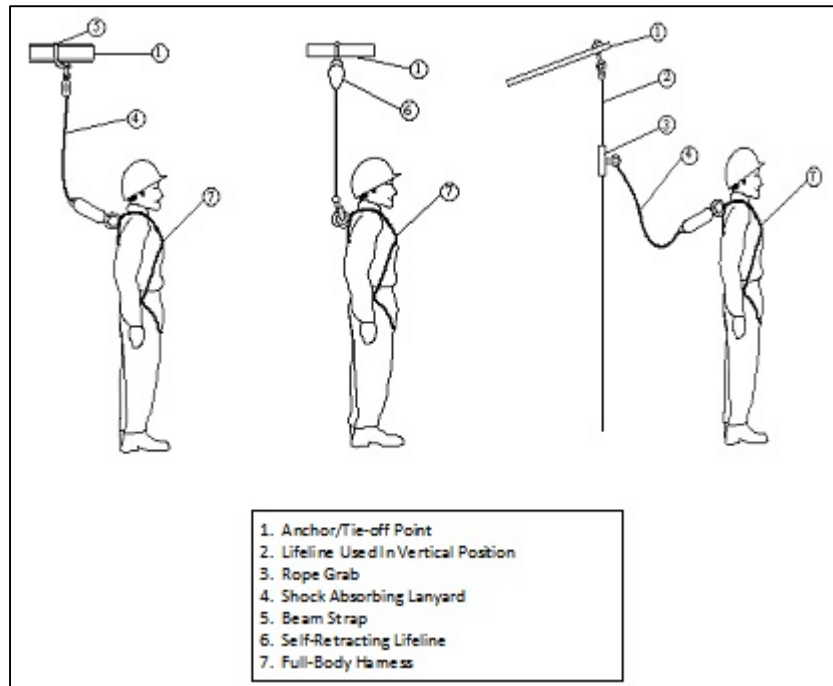


Figure 2 - Various Connection Methods for Personal Fall Arrest Systems (PFAS)

Personal Fall Arrest Systems (PFAS)

Where workers must work at an elevated working surface, exposed to fall hazards, where a free fall is possible and a fall restraint/prevention system is not feasible:

- A full-body harness, approved connecting lanyard and suitable anchor point must be used
- All PFAS components shall be compatible with each other
- All PFAS equipment shall meet applicable ANSI standards
- All PFAS equipment shall be used as per the manufacturer
- The fall distance shall be calculated for each work area. (See Figure 3). The equipment shall be rigged to not allow a falling worker to free fall more than 6' or strike a lower level. Fall restraint, that won't allow a free fall, is always preferable (see above)
- All snap hooks shall not allow pressure to be applied to the gate in the opening direction.
- Snap hooks shall be sized to be compatible with the member to which they are connected to prevent unintentional disengagement of the snap hook. Only a locking type snap hook designed and used to prevent disengagement of the snap hook by the contact of the snap hook keeper by the connected member shall be used.
- Horizontal lifelines shall be designed, installed, and used, under the supervision of a qualified person, as part of a complete personal fall arrest system, which maintains a safety factor of at least two.
- Lanyards and vertical lifelines shall have a minimum breaking strength of 5,000 pounds. Where vertical lifelines are used, each employee shall be attached to a separate lifeline.
- Lifelines shall be protected against being cut or abraded.
- Self-retracting lifelines and lanyards which automatically limit free fall distance to 2 feet or less shall be capable of sustaining a minimum tensile load of 3,000 pounds applied to the device with the lifeline or lanyard in the fully extended position.

- Anchorages used for attachment of personal fall arrest equipment shall be independent of any anchorage being used to support or suspend platforms and capable of supporting at least 5,000 pounds per employee attached, or shall be designed, installed, and used as part of a complete personal fall arrest system which maintains a safety factor of at least two and under the supervision of a qualified person.
- Systems used by an employee having a combined person and tool weight in excess of 310 pounds shall be modified to provide proper protection for such heavier loads.
- The attachment point of the connecting lanyard to the full-body harness shall be located in the center of the wearer's back near shoulder level, or above the wearer's head, except when climbing.
- Fall Protection equipment shall be utilized for employee protection only, and should not be used for any other use. For example, fall protection equipment should never be used as hoisting slings, tow ropes, etc.
- Personal fall arrest systems and components subjected to impact loading shall be immediately removed from service and shall not be used again for employee protection until inspected and determined by a competent person to be undamaged and suitable for reuse.
- Provide for prompt rescue of employees in the event of a fall or assure that employees are able to rescue themselves.
- Personal fall arrest systems shall be inspected prior to each use for wear, damage and other deterioration, and defective components shall be removed from service.
- Personal fall arrest systems shall not be attached to guardrail systems, nor shall they be attached to hoists unless prior approval is obtained from a competent person.
- If and when a personal fall arrest system is used at hoist areas, it shall be rigged to allow the movement of the employee only as far as the edge of the walking/working surface.

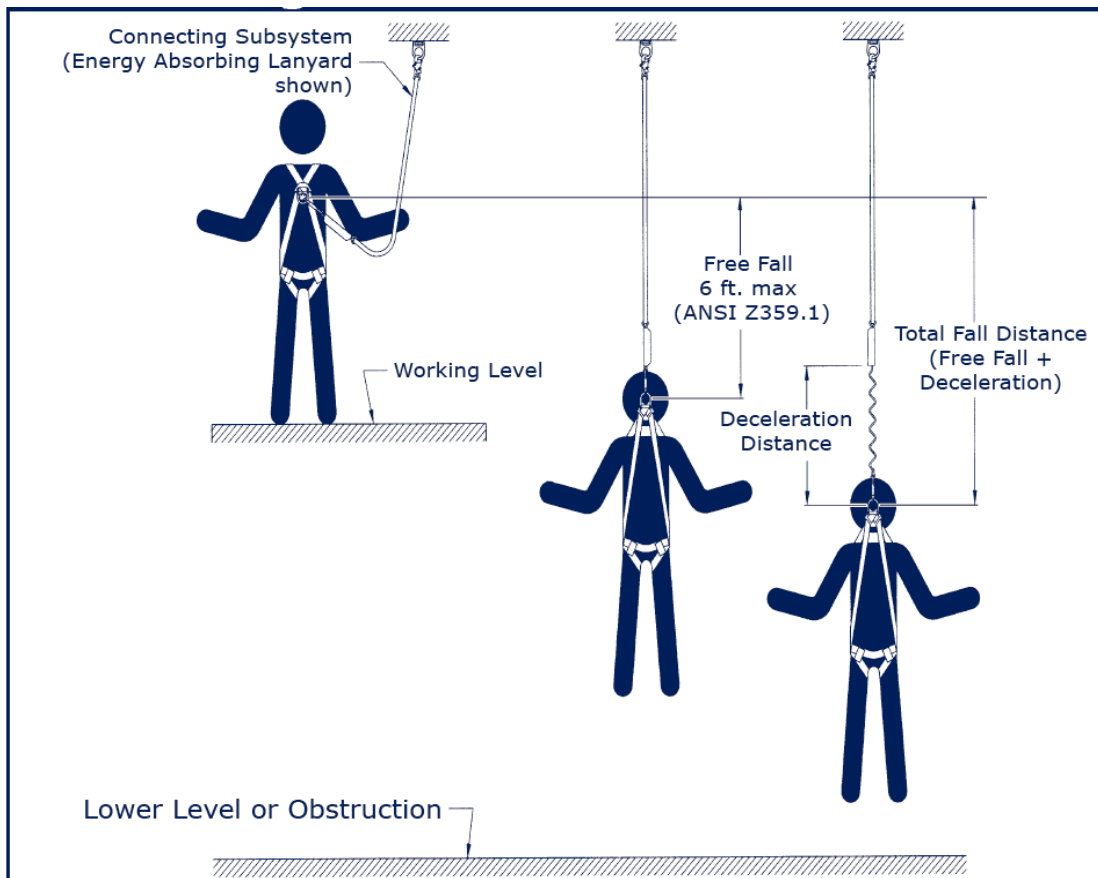


Figure 3 - Calculating Fall Distance When Using A Personal Fall Arrest System

Preventing a Fall

Fall hazards can be prevented or reduced by effectively eliminating the hazard through a number of methods:

- Complete as much work on the floor or ground as possible to eliminate or reduce the time working above ground
- Build and lift sub-assemblies into place rather than placing piece-by-piece above the ground
- Establish an effective guard railing system
- Consider a fall prevention/restraint system rather than a personal fall arrest system (PFAS)
- A fall prevention/restraint system involves the use of a full-body harness with connecting lanyard or lifeline arranged in such a way that does not allow the worker to reach an unprotected edge. With no free fall possible, a fall prevention/restraint system does not require a rated anchor point.

Stopping/Arresting a Fall

Personal Fall Arrest Systems (PFAS) are designed to protect workers that suffer a fall. PFAS employ the use of a full-body harness, a connecting lanyard and a suitable anchor point.

- All fall protection equipment must meet applicable ANSI and OSHA standards
- The anchor point must be capable of supporting at least 5000lbs for each employee attached
- The fall arrest system shall be rigged such that an employee can neither free fall more than 6 feet, nor contact any lower level
- Consider a self-retracting lanyard (SRL) that will limit the free fall to 2', or less
- The fall arrest system shall bring an employee to a complete stop and limit maximum deceleration distance an employee travels to 3.5 feet. **ALL fixed-length lanyards used by UVA workers will be equipped with a deceleration device designed to reduce the arresting forces on the body to less than 900ft/lbs.**
- The anchor point should be overhead and as close as possible to reduce fall arresting forces in the event a fall should occur
- Avoid anchor points where a fall may result in a pendulum motion that could cause serious injury aka swing-fall (See Figure 4)
- All fall protection equipment must be inspected and used as per the manufacturer
- Training is required for all workers using fall protection equipment
- ALL UVA staff members that use a PFAS, will use equipment produced by Miller Fall Protection, and supplied by Facility Management Safety only.
- Send additional requests for fall protection equipment to Facility Management Safety, for approval, prior to purchase

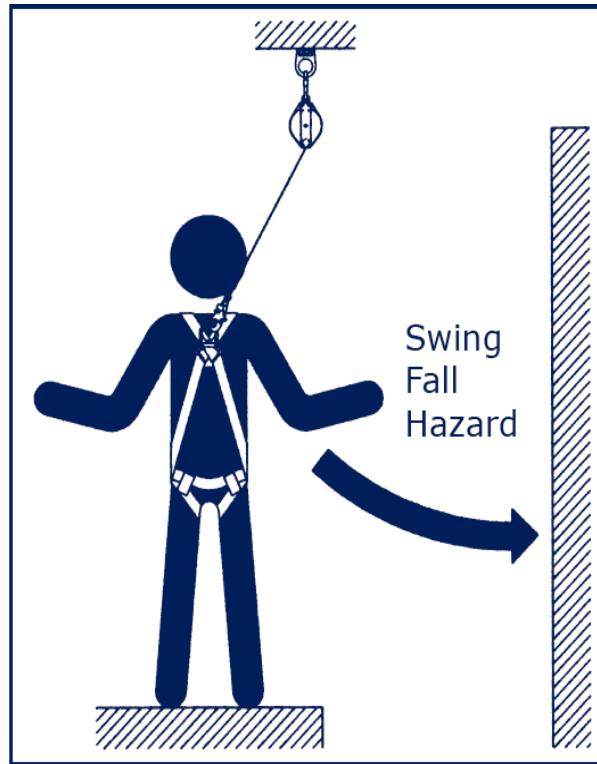


Figure 4 - Swing Fall Diagram

Protection from Falling Objects

When employees are required to work in proximity of others working with materials, tools, or equipment at elevated levels, barricades shall be erected around the immediate area of the overhead work to prohibit employees and pedestrians from entering the area where they could be exposed to overhead hazards.

Employees performing work at elevated levels shall keep tools, materials, and equipment away from the edge to keep potential objects from falling over the side. Where practical, tools, etc. shall be secured with rope, wire, etc. to keep them from falling.

Toeboards must be installed on all scaffolds and guard rail systems where workers or pedestrian are exposed to overhead hazards.

ALL workers exposed to overhead hazards must wear head protection (hard hats).

Elevated Personnel Platforms and Ladders

Work performed from truck-mounted or self-propelled aerial platforms, including extensible boom or articulating boom lifts, scissorlifts, and work platforms/baskets raised by forklifts or cranes shall require the use of a full-body harness and lanyard connected to the platform. Workers shall NEVER be tied off to adjacent structures.

Work from ladders can place employees above the protection of standard guardrails. When working from ladders, the ladder should be placed at a distance from the guardrail equal to the height of the ladder plus 4'. If the task requires the ladder be placed closer, the employee must be protected from falls with personal fall arrest system (PFAS).

Rooftop Work

Rooftop work is common for UVA employees. If the building is equipped with parapet walls, guardrails, or other barriers that extend at least 42" above the roof and provide a protective barrier between the worker and fall hazards, then the fall hazard has been eliminated and no further action or equipment is needed.

If the building is not equipped with features that protect workers from falls from the roof, the following elements must be in place to ensure worker rooftop safety:

- Perform a hazard analysis prior to each roof entry that includes a description of the work to be completed, the path from the roof access point to the work area, and the protective devices to be used.
- Limit access to the roof to only trained employees who are capable of recognizing, evaluating and controlling fall hazards
- Only allow access to the roof through a roof permit system
- Monitor the process and making continuous improvements as experience dictates

Options for protective devices for rooftop work include:

- Portable Guardrails
- Fall Restraint/Prevention Systems
- Personal Fall Arrest Systems

Roof hatches when left open, constitute a fall hazard. To eliminate the fall hazard, roof hatches must be kept closed while the work is underway unless the hatch opening is protected by guardrails.

Skylights also represent a fall hazard. When working on or in proximity of skylights, either the skylights must be effectively covered, protected with permanent or temporary guardrails or workers must wear a restraint system or PFAS.

Storage

A dedicated storage area shall be provided for the storage of fall protection equipment and all components. The storage area shall keep the equipment clean, dry, and free from oils, chemicals, paints, and excessive heat.

Inspections

Fall protection equipment shall be inspected before each use for wear, damage, other deterioration, or other defects as per the manufacturer.

Prompt Rescue of an Employee in the Event of a Fall

University Of Virginia shall provide for prompt rescue of employees in the event of a fall or shall assure the employees are able to rescue themselves.

Prior to the beginning of each elevated work assignment, the Supervisor or other competent person shall evaluate and plan for the prompt rescue of employees involved in a fall.

ALL full-body harnesses shall be provided with trauma straps designed to provide the wearer a means of maintaining normal blood flow to the legs in the event of a fall and extended rescue response.

Incident Investigations

University Of Virginia shall conduct an incident investigation in the event of a fall, near miss or other serious incident. The incident investigations will include an evaluation of both the fall protection plan and the execution of that plan for potential improvements to practices, procedures or training in order to prevent reoccurrence.

Any corrective actions generated as a result of the incident investigation shall be implemented immediately. Retraining for all workers will be conducted as needed.

Training

A training program shall be provided for each employee who may be exposed to fall hazards. Training shall enable each employee to recognize the hazards of falling and shall train each employee in the procedures to follow to minimize these hazards.

The training will be conducted by a competent person qualified in the following areas:

- The nature of fall hazards in the work area
- The correct procedures for erecting, maintaining, disassembling and inspecting the fall protection systems to be used
- The use and operation of guardrail systems, personal fall arrest systems (PFAS), and other protection to be used
- The role of employees in fall protection plans
- Review of any previous falls or near-misses and corrective action taken
- The OSHA safety standards that address occupational fall protection

Certification

UVA shall verify compliance with the training requirements by preparing a written certification record. The written certification record shall contain:

- The name of the employees trained
- The dates of training
- The name and signature of the person who conducted the training

The latest fall protection training certification shall be maintained and accessible at all times.

Retraining

Retraining shall be provided when management has reason to believe that any affected employee who has already received training does not have the understanding and skill required to perform work and effectively utilize fall protection equipment. Circumstances where retraining is required may include situations where:

- Changes in the workplace render previous training obsolete
- Changes in the types of fall protection systems or equipment to be used that render previous training obsolete
- Inadequacies in an affected employee's performance or knowledge of fall protection systems that may indicate that the employee has not retained the requisite understanding or skill
- Deficiencies in the fall protection plan or incident investigations determine that additional retraining is necessary.